COMAN: Researchers build first fully-limbed passive compliant robot (w/ video)

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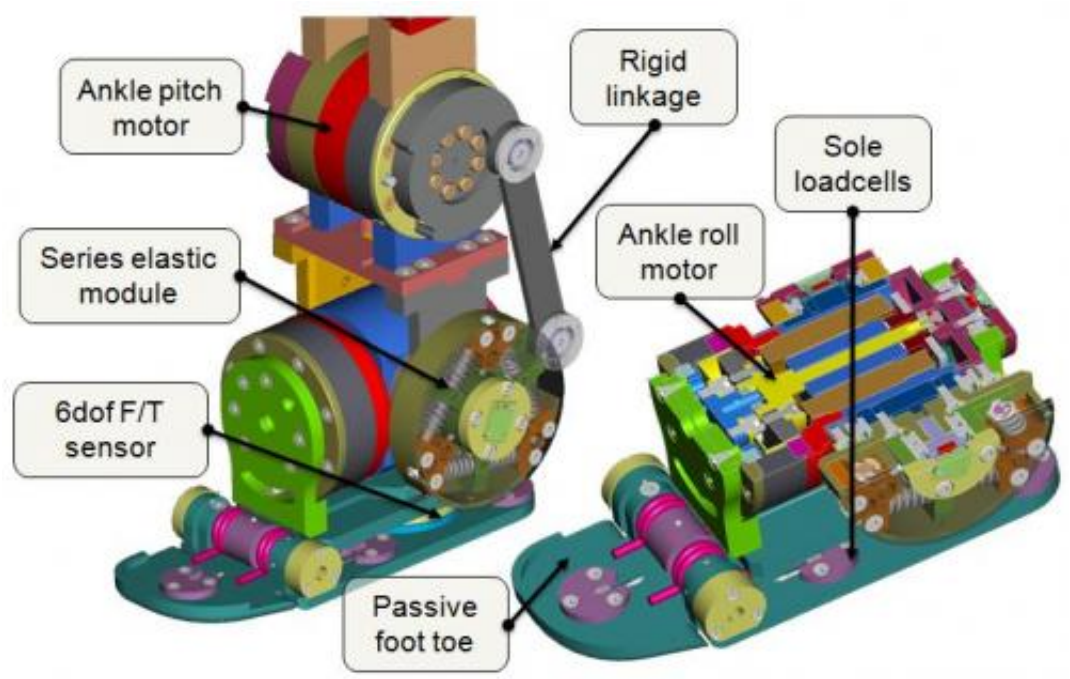
COMAN Humanoid. Credit: IIT

(Phys.org) —Researchers at the Italian Institute of Technology with funding from the European AMARSI project have built the first passive compliant robot that features both arms and legs. Passive compliant

robots are those that have flexible joints that allow the robot to move in more human-like ways. The new robot, called the COmpliant huMANoid (COMAN), is approximately the size of a child and is able to maintain its upright position even when knocked around.

Most robots, as demonstrated by various robotic development groups in videos posted to YouTube, have stiff joints, which result in jerky or stiff movement. The problem with such joints is that they make the robot unstable—a slight misstep could mean a fall or worse, injury to a person nearby. To smooth the gait and overall movement of robots, engineers have been investigating different types of flexible joint mechanisms. In this latest effort, the team used very small elastic actuators in the parts of the robot that need to flex or extend. They also added torque sensors to each joint that allow the central processor to cause the actuators to respond very quickly to external events, such as encountering an inclined path, or to being run into by other objects or people. What's groundbreaking here is that the engineers created special compliant joints for so many areas of the robot's body—a total of 25. COMAN has both arms and legs with joints and associated sensors in its ankles, knees, hips, waist, elbow, shoulder and neck. It walks with a more human gait and displays a very human-like ability to stand upright despite being knocked around by its makers.

At just 94.5 cm tall and weighing in at 31.2 kg, COMAN appears far more approachable than most robots, despite the lack of a head—the team says they plan to add one at some point—and for that reason it seems more likely to be deployed as a domestic servant, rather than as a soldier or tool for disaster assistance as seems to be the case with so many other robots being developed.



CAD assembly of the COMAN ankle modules. Credit: IIT

As part of their research effort, the team also developed a way to calculate the optimal joint elasticity for the various joints—current methods rely on trial and error. That should help speed up the development of passive compliant robots as the group has shared what they've learned with others.

More information: COmpliant HuMANoid Platform (COMAN): www.iit.it/en/robots/coman.html

via IEEE

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